NetApp

LUNs

System Manager Classic

NetApp
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LUNs

You can use System Manager to manage LUNs.

You can access all the LUNs in the cluster by using the LUNs tab or you can access the LUNs specific to the SVM by using **SVMs** > **LUNs**.

> **ⓘ**   The LUNs tab is displayed only if you have enabled the FC/FCoE and iSCSI licenses.

Related information

SAN administration

Create FC SAN optimized LUNs

You can use System Manager to create one or more FC SAN optimized LUNs during the initial setup of a cluster on an AFF platform.

Before you begin

- You must ensure that only one storage virtual machine (SVM) has been created with the name AFF_SAN_DEFAULT_SVM, and that this SVM does not contain any LUNs.

- You must have verified that the hardware setup has been completed successfully.

  ONTAP 9 Documentation Center

About this task

- This method is available only during the initial setup of a cluster with two or more nodes.

  System Manager uses only the first two nodes to create LUNs.

- Each LUN is created on a separate volume.

- Volumes are thin provisioned.

- Space reservation is disabled on the created LUNs.

- Most of the cluster configurations are already completed at the factory and are optimized for optimum storage efficiency and performance.

  You must not modify these configurations.

Steps

1. Log in to System Manager by using your cluster administrator credentials.

   After you create LUNs using this method, you cannot use this method again.

   If you close the dialog box without creating LUNs, you must navigate to the LUNs tab and click **Create** to access the dialog box again.

2. In the **LUN details** area of the **Create LUNs** dialog box, specify the application type:

If the application type is…	Then…
Oracle	a. Specify the database name and size. b. If you have deployed Oracle Real Application Clusters (RAC), then select the **Oracle RAC** check box. Only two RAC nodes are supported. You must ensure that Oracle RAC has a minimum of two initiators added to the initiator group.
SQL	Specify the number of databases and the size of each database.
Other	a. Specify the name and size of each LUN. b. If you want to create more LUNs, click **Add more LUNs**, and then specify the name and size for each LUN.

Data, log, binary, and temporary LUNs are created based on the selected application type.

3. In the **Map to these Initiators** area, perform these steps:

   a. Specify the initiator group name and the type of operating system.
   b. Add the host initiator WWPN by selecting it from the drop-down list or by typing the initiator in the text box.
   c. Add the alias for the initiator.

   Only one initiator group is created.

4. Click **Create**.

   A summary table is displayed with the LUNs that are created.

5. Click **Close**.

Related information

[ONTAP 9 Documentation Center](#)

Application-specific LUN settings

System Manager supports Oracle, SQL, and other application types while creating FC SAN optimized LUNs on an AFF cluster. LUN settings such as the LUN size are determined by rules specific to the application type. For SQL and Oracle, LUN settings are automatically created.

If your cluster contains two or more nodes, System Manager uses only the first two nodes selected by the API to create LUNs. Data aggregates are already created in each of the two nodes. The size of each volume created is equal to the available capacity of the aggregate. The volumes are thin-provisioned and space

reservation is disabled on the LUNs.

Storage efficiency policy is enabled by default with the schedule set to "daily" and quality of service (QoS) set to "best_effort". By default, access time (atime) update is enabled on the cluster. However, access time updates are disabled by System Manager while creating volumes and therefore every time a file is read or written, the access time field in the directory is not updated.

> ⓘ Enabling the access time update causes performance degradation to the data-serving capability of the cluster.

LUN settings for SQL

By default, LUNs and volumes are provisioned for a single instance of the SQL server with 2 databases of 1 TB each and 24 physical cores. Space is provisioned for LUNs and volumes according to specific rules for the SQL server. Load balancing is performed for LUNs across the HA pair. You can modify the number of databases. For each database, eight data LUNs and one log LUN is created. One temporary LUN is created for each SQL instance.

The following table provides information about how space is provisioned for the default values of SQL:

Node	Aggregate	LUN type	Volume name	LUN name	Formula for LUN size	LUN size (GB)
node1	node1_aggr1	data	db01_data01	db01_data01	Database size ÷ 8	125
		data	db01_data02	db01_data02	Database size ÷ 8	125
		data	db01_data03	db01_data03	Database size ÷ 8	125
		data	db01_data04	db01_data04	Database size ÷ 8	125
		data	db02_data01	db02_data01	Database size ÷ 8	125
		data	db02_data02	db02_data02	Database size ÷ 8	125
		data	db02_data03	db02_data03	Database size ÷ 8	125
		data	db02_data04	db02_data04	Database size ÷ 8	125
		log	db01_log	db01_log	Database size ÷ 20	50

Node	Aggregate	LUN type	Volume name	LUN name	Formula for LUN size	LUN size (GB)
		temp	sql_temp	sql_temp	Database size ÷ 3	330
node2	node2_aggr1	data	db01_data05	db01_data05	Database size ÷ 8	125
		data	db01_data06	db01_data06	Database size ÷ 8	125
		data	db01_data07	db01_data07	Database size ÷ 8	125
		data	db01_data08	db01_data08	Database size ÷ 8	125
		data	db02_data05	db02_data05	Database size ÷ 8	125
		data	db02_data06	db02_data06	Database size ÷ 8	125
		data	db02_data07	db02_data07	Database size ÷ 8	125
		data	db02_data08	db02_data08	Database size ÷ 8	125
		log	db02_log	db02_log	Database size ÷ 20	50

LUN settings for Oracle

By default, LUNs and volumes are provisioned for one database of 2 TB. Space is provisioned for LUNs and volumes according to specific rules for Oracle. By default, Oracle Real Application Clusters (RAC) is not selected.

The following table provides information about how space is provisioned for the default values of Oracle:

Node	Aggregate	LUN type	Volume name	LUN name	Formula for LUN size	LUN size (GB)
node1	node1_aggr1	data	ora_vol01	ora_lundata01	Database size ÷ 8	250

Node	Aggregate	LUN type	Volume name	LUN name	Formula for LUN size	LUN size (GB)
		data	ora_vol02	ora_lundata02	Database size ÷ 8	250
		data	ora_vol03	ora_lundata03	Database size ÷ 8	250
		data	ora_vol04	ora_lundata04	Database size ÷ 8	250
		log	ora_vol05	ora_lunlog1	Database size ÷ 40	50
		binaries	ora_vol06	ora_orabin1	Database size ÷ 40	50
node2	node2_aggr1	data	ora_vol07	ora_lundata05	Database size ÷ 8	250
		data	ora_vol08	ora_lundata06	Database size ÷ 8	250
		data	ora_vol09	ora_lundata07	Database size ÷ 8	250
		data	ora_vol10	ora_lundata08	Database size ÷ 8	250
		log	ora_vol11	ora_lunlog2	Database size ÷ 40	50

For Oracle RAC, LUNs are provisioned for grid files. Only two RAC nodes are supported for Oracle RAC.

The following table provides information about how space is provisioned for the default values of Oracle RAC:

Node	Aggregate	LUN type	Volume name	LUN name	Formula for LUN size	LUN size (GB)
node1	node1_aggr1	data	ora_vol01	ora_lundata01	Database size ÷ 8	250
		data	ora_vol02	ora_lundata02	Database size ÷ 8	250
		data	ora_vol03	ora_lundata03	Database size ÷ 8	250

Node	Aggregate	LUN type	Volume name	LUN name	Formula for LUN size	LUN size (GB)
		data	ora_vol04	ora_lundata04	Database size ÷ 8	250
		log	ora_vol05	ora_lunlog1	Database size ÷ 40	50
		binaries	ora_vol06	ora_orabin1	Database size ÷ 40	50
		grid	ora_vol07	ora_lungrid1	10 GB	10
node2	node2_aggr1	data	ora_vol08	ora_lundata05	Database size ÷ 8	250
		data	ora_vol09	ora_lundata06	Database size ÷ 8	250
		data	ora_vol10	ora_lundata07	Database size ÷ 8	250
		data	ora_vol11	ora_lundata08	Database size ÷ 8	250
		log	ora_vol12	ora_lunlog2	Database size ÷ 40	50
		binaries	ora_vol13	ora_orabin2	Database size ÷ 40	50

LUN settings for other application type

Each LUN is provisioned in a volume. The space is provisioned in the LUNs based on the specified size. Load balancing is performed across the nodes for all the LUNs.

Create LUNs

You can use System Manager to create LUNs for an existing aggregate, volume, or qtree when there is available free space. You can create a LUN in an existing volume or create a new FlexVol volume for the LUN. You can also enable storage Quality of Service (QoS) to manage the workload performance.

About this task

If you specify the LUN ID, System Manager checks the validity of the LUN ID before adding it. If you do not specify a LUN ID, ONTAP software automatically assigns one.

While selecting the LUN multiprotocol type, you should have considered the guidelines for using each type. The LUN Multiprotocol Type, or operating system type, determines the layout of data on the LUN, and the minimum and maximum sizes of the LUN. After the LUN is created, you cannot modify the LUN host operating system type.

In a MetroCluster configuration, System Manager displays only the following aggregates for creating FlexVol volumes for the LUN:

- In normal mode, when you create volumes on sync-source SVMs or data-serving SVMs in the primary site, only those aggregates that belong to the cluster in the primary site are displayed.
- In switched-over mode, when you create volumes on sync-destination SVMs or data-serving SVMs in the surviving site, only switched-over aggregates are displayed.

Steps

1. Click **Storage** > **LUNs**.

2. In the **LUN Management** tab, click **Create**.

3. Browse and select an SVM in which you want to create the LUNs.

4. In the **Create LUN Wizard**, specify the name, size, type, description for the LUN, and select the **Space Reserve**, and then click **Next**.

5. Create a new FlexVol volume for the LUN or select an existing volume or qtree, and then click **Next**.

6. Add initiator groups if you want to control host access to the LUN, and then click **Next**.

7. Select the **Manage Storage Quality of Service** check box if you want to manage the workload performance of the LUN.

8. Create a new storage QoS policy group or select an existing policy group to control the input/output (I/O) performance of the LUN:

If you want to…	Do this…

Create a new policy group	a. Select **New Policy Group**
	
	b. Specify the policy group name.
	
	c. Specify the minimum throughput limit.
	
	   ◦ In System Manager 9.5, you can set the minimum throughput limit only on a performance-based All Flash Optimized personality. In System Manager 9.6, you can also set the minimum throughput limit for ONTAP Select Premium systems.
	
	   ◦ You cannot set the minimum throughput limit for volumes on a FabricPool-enabled aggregate.
	
	   ◦ If you do not specify the minimum throughput value or if the minimum throughput value is set to 0, the system automatically displays "None" as the value.
	
	     This value is case-sensitive.
	
	d. Specify the maximum throughput limit to ensure that the workload of the objects in the policy group does not exceed the specified throughput limit.
	
	   ◦ The minimum throughput limit and the maximum throughput limit must be of the same unit type.
	
	   ◦ If you do not specify the minimum throughput limit, then you can set the maximum throughput limit in IOPS and B/s, KB/s, MB/s, and so on.
	
	   ◦ If you do not specify the maximum throughput value, the system automatically displays "Unlimited" as the value and this value is case-sensitive.
	
	     The unit that you specify does not affect the maximum throughput.

If you want to…	Do this…
Select an existing policy group	a. Select **Existing Policy Group**, and then click **Choose** to select an existing policy group from the Select Policy Group dialog box. b. Specify the minimum throughput limit. ◦ In System Manager 9.5, you can set the minimum throughput limit only on a performance-based All Flash Optimized personality. In System Manager 9.6, you can also set the minimum throughput limit for ONTAP Select Premium systems. ◦ You cannot set the minimum throughput limit for volumes on a FabricPool-enabled aggregate. ◦ If you do not specify the minimum throughput value or if the minimum throughput value is set to 0, the system automatically displays "None" as the value. This value is case-sensitive. c. Specify the maximum throughput limit to ensure that the workload of the objects in the policy group does not exceed the specified throughput limit. ◦ The minimum throughput limit and the maximum throughput limit must be of the same unit type. ◦ If you do not specify the minimum throughput limit, then you can set the maximum throughput limit in IOPS and B/s, KB/s, MB/s, and so on. ◦ If you do not specify the maximum throughput value, the system automatically displays "Unlimited" as the value and this value is case-sensitive. The unit that you specify does not affect the maximum throughput. If the policy group is assigned to more than one object, the maximum throughput that you specify is shared among the objects.

9. Review the specified details in the **LUN summary** window, and then click **Next**.

10. Confirm the details, and then click **Finish** to complete the wizard.

Related information

Deleting LUNs

You can use System Manager to delete LUNs and return the space used by the LUNs to their containing aggregates or volumes.

Before you begin

- The LUN must be offline.

- The LUN must be unmapped from all initiator hosts.

Steps

1. Click **Storage** > **LUNs**.

2. In the **LUN Management** tab, select one or more LUNs that you want to delete, and then click **Delete**.

3. Select the confirmation check box, and then click **Delete**.

Related information

Create initiator groups

You can use System Manager to create an initiator group. Initiator groups enable you to control host access to specific LUNs. You can use port sets to limit which LIFs an initiator can access.

Steps

1. Click **Storage** > **LUNs**.

2. In the **Initiator Groups** tab, click **Create**.

3. In the **General** tab of the **Create Initiator Group** dialog box, specify the initiator group name, operating system, host alias name, port set, and supported protocol for the group.

4. Click **Create**.

Related information

Deleting initiator groups

You can use the Initiator Groups tab in System Manager to delete initiator groups.

Before you begin

All the LUNs mapped to the initiator group must be manually unmapped.

Steps

1. Click **Storage** > **LUNs**.

2. In the **Initiator Groups** tab, select one or more initiator groups that you want to delete, and then click **Delete**.

3. Click **Delete**.

4. Verify that the initiator groups you deleted are no longer displayed in the **Initiator Groups** tab.

Related information

LUNs window

Add initiators

You can use System Manager to add initiators to an initiator group. An initiator provides access to a LUN when the initiator group that it belongs to is mapped to that LUN.

Steps

1. Click **Storage** > **LUNs**.

2. In the **LUN Management** tab, select the initiator group to which you want to add initiators and click **Edit**.

3. In the **Edit Initiator Group** dialog box, click **Initiators**.

4. Click **Add**.

5. Specify the initiator name and click **OK**.

6. Click **Save and Close**.

Related information

LUNs window

Deleting initiators from an initiator group

You can use the Initiator Groups tab in System Manager to delete an initiator. To delete an initiator from an initiator group, you must disassociate the initiator from the initiator group.

Before you begin

All of the LUNs that are mapped to the initiator group that contains the initiator that you want to delete must be manually unmapped.

Steps

1. Click **Storage** > **LUNs**.

2. In the **Initiator Groups** tab, select the initiator group from which you want to delete the initiator, and then click **Edit**.

3. In the **Edit Initiator Group** dialog box, click the **Initiators** tab.

4. Select and delete the initiator from the text box, and click **Save**.

   The initiator is disassociated from the initiator group.

Create port sets

You can use System Manager to create port sets to limit access to your LUNs.

Steps

1. Click **Storage** > **LUNs**.

2. In the **Portsets** tab, click **Create**.

3. In the **Create Portset** dialog box, select the type of protocol.

4. Choose the network interface that you want to associate with the port set.

5. Click **Create**.

Deleting port sets

You can use System Manager to delete a port set when it is no longer required.

Steps

1. Click **Storage** > **LUNs**.

2. In the **Portsets** tab, select one or more port sets and click **Delete**.

3. Confirm the deletion by clicking **Delete**.

Cloning LUNs

LUN clones enable you to create multiple readable and writable copies of a LUN. You can use System Manager to create a temporary copy of a LUN for testing or to make a copy of your data available to additional users without providing them access to the production data.

Before you begin

- You must have installed the FlexClone license on the storage system.

- When space reservation is disabled on a LUN, the volume that contains the LUN must have enough space to accommodate changes to the clone.

About this task

- When you create a LUN clone, automatic deletion of the LUN clone is enabled by default in System Manager.

  The LUN clone is deleted when ONTAP triggers automatic deletion to conserve space.

- You cannot clone LUNs that are on SnapLock volumes.

Steps

1. Click **Storage** > **LUNs**.

2. In the **LUN Management** tab, select the LUN that you want to clone, and then click **Clone**.

3. If you want to change the default name, specify a new name for the LUN clone.

4. Click **Clone**.

5. Verify that the LUN clone that you created is listed in the **LUNs** window.

Related information

LUNs window

Editing LUNs

You can use the LUN properties dialog box in System Manager to change the name, description, size, space reservation setting, or the mapped initiator hosts of a LUN.

About this task

When you resize a LUN, you have to perform the steps on the host side that are recommended for the host type and the application that is using the LUN.

Steps

1. Click **Storage** > **LUNs**.

2. In the **LUN Management** tab, select the LUN that you want to edit from the list of LUNs, and click **Edit**.

3. Make the required changes.

4. Click **Save and Close**.

Related information

LUNs window

Bringing LUNs online

You can use the **LUN Management** tab in System Manager to bring selected LUNs online and make them available to the host.

Before you begin

Any host application accessing the LUN must be quiesced or synchronized.

Steps

1. Click **Storage** > **LUNs**.

2. In the **LUN Management** tab, select one or more LUNs that you want to bring online.

3. Click **Status** > **Online**.

Related information

LUNs window

Taking LUNs offline

You can use the **LUN Management** tab in System Manager to take selected LUNs offline and make them unavailable for block protocol access.

Before you begin

Any host application accessing the LUN must be quiesced or synchronized.

Steps

1. Click **Storage** > **LUNs**.

2. In the **LUN Management** tab, select one or more LUNs that you want to take offline.

3. Click **Status** > **Offline**.

Related information

LUNs window

Moving LUNs

You can use System Manager to move a LUN from its containing volume to another volume or qtree within a storage virtual machine (SVM). You can move the LUN to a volume that is hosted on an aggregate containing high-performance disks, thereby improving the performance when accessing the LUN.

About this task

- You cannot move a LUN to a qtree within the same volume.

- If you have created a LUN from a file using the command-line interface (CLI), you cannot move the LUN using System Manager.

- The LUN move operation is nondisruptive; it can be performed when the LUN is online and serving data.

- You cannot use System Manager to move the LUN if the allocated space in the destination volume is not sufficient to contain the LUN, and even if autogrow is enabled on the volume.

  You should use the CLI instead.

- You cannot move LUNs on SnapLock volumes.

Steps

1. Click **Storage** > **LUNs**.

2. In the **LUN Management** tab, select the LUN that you want to move from the list of LUNs, and then click **Move**.

3. In the **Move Options** area of the **Move LUN** dialog box, specify a new name for the LUN if you want to change the default name.

4. Select the storage object to which you want to move the LUN and perform one of the following actions:

If you want to move the LUN to…	Then…
A new volume	a. Select an aggregate in which you want to create the new volume. b. Specify a name for the volume.
An existing volume or qtree	a. Select a volume to which you want to move the LUN. b. If the selected volume contains any qtrees, select the qtree to which you want to move the LUN.

5. Click **Move**.

6. Confirm the LUN move operation, and click **Continue**.

   For a brief period of time, the LUN is displayed on both the origin and destination volume. After the move operation is complete, the LUN is displayed on the destination volume.

   The destination volume or qtree is displayed as the new container path for the LUN.

Assigning LUNs to storage QoS

You can use System Manager to limit the throughput of LUNs by assigning them to storage Quality of Service (QoS) policy groups. You can assign storage QoS for new LUNs or modify storage QoS details for LUNs that are already assigned to a policy group.

About this task

- You cannot assign storage QoS to a LUN if the following storage objects are assigned to a policy group:
  - Parent volume of the LUN
  - Parent storage virtual machine (SVM) of the LUN
- You can assign storage QoS or modify the QoS details for a maximum of 10 LUNs simultaneously.

Steps

1. Click **Storage** > **LUNs**.

2. In the **LUN Management** tab, select one or more LUNs for which you want to assign storage QoS.

3. Click **Storage QoS**.

4. In the **Quality of Service Details** dialog box, select the **Manage Storage Quality of Service** check box if you want to manage the workload performance of the LUN.

   If some of the LUNs that you selected are already assigned to a policy group, the changes that you make might affect the performance of these LUNs.

5. Create a new storage QoS policy group or select an existing policy group to control the input/output (I/O) performance of the LUN:

If you want to…	Do this…

Create a new policy group	a. Select **New Policy Group**.
	
	b. Specify the policy group name.
	
	c. Specify the minimum throughput limit.
	
	    ◦ In System Manager 9.5, you can set the minimum throughput limit only on a performance-based All Flash Optimized personality. In System Manager 9.6, you can also set the minimum throughput limit for ONTAP Select Premium systems.
	
	    ◦ You cannot set the minimum throughput limit for volumes on a FabricPool-enabled aggregate.
	
	    ◦ If you do not specify the minimum throughput value or if the minimum throughput value is set to 0, the system automatically displays "None" as the value.
	
	      This value is case-sensitive.
	
	d. Specify the maximum throughput limit to ensure that the workload of the objects in the policy group does not exceed the specified throughput limit.
	
	    ◦ The minimum throughput limit and the maximum throughput limit must be of the same unit type.
	
	    ◦ If you do not specify the minimum throughput limit, then you can set the maximum throughput limit in IOPS and B/s, KB/s, MB/s, and so on.
	
	    ◦ If you do not specify the maximum throughput value, the system automatically displays "Unlimited" as the value and this value is case-sensitive.
	
	      The unit that you specify does not affect the maximum throughput.

If you want to…	Do this…

Select an existing policy group	a. Select **Existing Policy Group**, and then click **Choose** to select an existing policy group from the Select Policy Group dialog box.
	
	b. Specify the minimum throughput limit.
	
	   ◦ In System Manager 9.5, you can set the minimum throughput limit only on a performance-based All Flash Optimized personality. In System Manager 9.6, you can also set the minimum throughput limit for ONTAP Select Premium systems.
	
	   ◦ You cannot set the minimum throughput limit for volumes on a FabricPool-enabled aggregate.
	
	   ◦ If you do not specify the minimum throughput value or if the minimum throughput value is set to 0, the system automatically displays "None" as the value.
	
	     This value is case-sensitive.
	
	c. Specify the maximum throughput limit to ensure that the workload of the objects in the policy group does not exceed the specified throughput limit.
	
	   ◦ The minimum throughput limit and the maximum throughput limit must be of the same unit type.
	
	   ◦ If you do not specify the minimum throughput limit, then you can set the maximum throughput limit in IOPS and B/s, KB/s, MB/s, and so on.
	
	   ◦ If you do not specify the maximum throughput value, the system automatically displays "Unlimited" as the value and this value is case-sensitive.
	
	     The unit that you specify does not affect the maximum throughput.
	
	     If the policy group is assigned to more than one object, the maximum throughput that you specify is shared among the objects.

6. Click the link that specifies the number of LUNs to review the list of selected LUNs, and click **Discard** if you want to remove any LUNs from the list.

   The link is displayed only when multiple LUNs are selected.

7. Click **OK**.

Editing initiator groups

You can use the Edit Initiator Group dialog box in System Manager to change the name of an existing initiator group and its operating system. You can add initiators to or remove initiators from the initiator group. You can also change the port set associated with the initiator group.

Steps

1. Click **Storage** > **LUNs**.

2. In the **Initiator Groups** tab, select the initiator group that you want to modify, and then click **Edit**.

3. Make the necessary changes.

4. Click **Save and Close**.

5. Verify the changes you made to the initiator group in the **Initiator Groups** tab.

Related information

LUNs window

Editing initiators

You can use the Edit Initiator Group dialog box in System Manager to change the name of an existing initiator in an initiator group.

Steps

1. Click **Storage** > **LUNs**.

2. In the **Initiator Groups** tab, select the initiator group to which the initiator belongs, and then click **Edit**.

3. In the **Edit Initiator Group** dialog box, click **Initiators**.

4. Select the initiator that you want to edit and click **Edit**.

5. Change the name and click **OK**.

6. Click **Save and Close**.

Related information

LUNs window

Editing port sets

You can use the Portsets tab in System Manager to edit settings related to port sets.

Steps

1. Click **Storage** > **LUNs**.

2. In the **Portsets** tab, select the port set you want to edit and click **Edit**.

3. In the **Edit Portset** dialog box, make the necessary changes.

4. Click **Save and Close**.

Related information

Viewing LUN information

You can use the LUN Management tab in System Manager to view details about a LUN, such as its name, status, size, and type.

Steps

1. Click **Storage** > **LUNs**.

2. In the **LUN Management** tab, select the LUN that you want to view information about from the displayed list of LUNs.

3. Review the LUN details in the **LUNs** window.

Viewing initiator groups

You can use the Initiator Groups tab in System Manager to view all the initiator groups and the initiators mapped to these initiator groups, and the LUNs and LUN ID mapped to the initiator groups.

Steps

1. Click **Storage** > **LUNs**.

2. Click **Initiator Groups** and review the initiator groups that are listed in the upper pane.

3. Select an initiator group to view the initiators that belong to it, which are listed in the **Initiators** tab in the lower pane.

4. Select an initiator group to view the LUNs mapped to it, which are listed in the **Mapped LUNs** in the lower pane.

Guidelines for working with FlexVol volumes that contain LUNs

When you work with FlexVol volumes that contain LUNs, you must change the default settings for Snapshot copies. You can also optimize the LUN layout to simplify administration.

Snapshot copies are required for many optional features such as SnapMirror, SyncMirror, dump and restore, and ndmpcopy.

When you create a volume, ONTAP automatically performs the following:

- Reserves 5 percent of the space for Snapshot copies
- Schedules Snapshot copies

Because the internal scheduling mechanism for creating Snapshot copies within ONTAP does not ensure that

the data within a LUN is in a consistent state, you should change these Snapshot copy settings by performing the following tasks:

- Turn off the automatic Snapshot copy schedule.
- Delete all of the existing Snapshot copies.
- Set the percentage of space reserved for Snapshot copies to zero.

You should use the following guidelines to create volumes that contain LUNs:

- Do not create any LUNs in the system's root volume.

  ONTAP uses this volume to administer the storage system. The default root volume is /vol/vol0.

- You should use a SAN volume to contain the LUN.
- You should ensure that no other files or directories exist in the volume that contains the LUN.

  If this is not possible and you are storing LUNs and files in the same volume, you should use a separate qtree to contain the LUNs.

- If multiple hosts share the same volume, you should create a qtree on the volume to store all of the LUNs for the same host.

  This is a best practice that simplifies LUN administration and tracking.

- To simplify management, you should use naming conventions for LUNs and volumes that reflect their ownership or the way that they are used.

Related information

[ONTAP 9 Documentation Center](#)

Understanding space reservations for LUNs

Understanding how the space reservation setting (combined with the volume guarantee) affects how space is set aside for LUNs helps you to understand the ramifications of disabling space reservations, and why certain combinations of LUN and volume settings are not useful.

When a LUN has space reservations enabled (a space-reserved LUN), and its containing volume has a volume guarantee, free space from the volume is set aside for the LUN at creation time; the size of this reserved space is governed by the size of the LUN. Other storage objects in the volume (other LUNs, files, Snapshot copies, and so on) are prevented from using this space.

When a LUN has space reservations disabled (a non-space-reserved LUN), no space is set aside for that LUN at creation time. The storage required by any write operation to the LUN is allocated from the volume when it is needed, provided sufficient free space is available.

If a space-reserved LUN is created in a none-guaranteed volume, the LUN behaves the same as a non-space-reserved LUN. This is because a none-guaranteed volume has no space to allocate to the LUN; the volume itself can only allocate space as it is written to, due to its none guarantee. Therefore, creating a space-reserved LUN in a none-guaranteed volume is not recommended; employing this configuration combination might provide write guarantees that are in fact impossible.

When the space reserve is set to "Default", the ONTAP space reservation settings apply to the LUNs. ONTAP space reservation settings also apply to the container volumes if new volumes are created.

Guidelines for using LUN multiprotocol type

The LUN multiprotocol type, or operating system type, specifies the operating system of the host accessing the LUN. It also determines the layout of data on the LUN, and the minimum and maximum size of the LUN.

> ⓘ Not all ONTAP versions support all LUN multiprotocol types. For the latest information, see the Interoperability Matrix Tool.

The following table describes the LUN multiprotocol type values and the guidelines for using each type:

LUN multiprotocol type	When to use
AIX	If your host operating system is AIX.
HP-UX	If your host operating system is HP-UX.
Hyper-V	If you are using Windows Server 2008 or Windows Server 2012 Hyper-V and your LUNs contain virtual hard disks (VHDs). If you are using hyper_v for your LUN type, you should also use hyper_v for your igroup OS type. ⓘ For raw LUNs, you can use the type of child operating system that the LUN multiprotocol type uses.
Linux	If your host operating system is Linux.
NetWare	If your host operating system is NetWare.
OpenVMS	If your host operating system is OpenVMS.
Solaris	If your host operating system is Solaris and you are not using Solaris EFI labels.
Solaris EFI	If you are using Solaris EFI labels. ⓘ Using any other LUN multiprotocol type with Solaris EFI labels might result in LUN misalignment problems.

LUN multiprotocol type	When to use
VMware	If you are using an ESX Server and your LUNs will be configured with VMFS. ⓘ If you configure the LUNs with RDM, you can use the guest operating system as the LUN multiprotocol type.
Windows 2003 MBR	If your host operating system is Windows Server 2003 using the MBR partitioning method.
Windows 2003 GPT	If you want to use the GPT partitioning method and your host is capable of using it. Windows Server 2003, Service Pack 1 and later are capable of using the GPT partitioning method, and all 64-bit versions of Windows support it.
Windows 2008 or later	If your host operating system is Windows Server 2008 or later; both MBR and GPT partitioning methods are supported.
Xen	If you are using Xen and your LUNs will be configured with Linux LVM with Dom0. ⓘ For raw LUNs, you can use the type of guest operating system that the LUN multiprotocol type uses.

Related information

Creating LUNs

NetApp Interoperability

Solaris Host Utilities 6.1 Installation and Setup Guide

Solaris Host Utilities 6.1 Quick Command Reference

Solaris Host Utilities 6.1 Release Notes

Understanding LUN clones

LUN clones are writable, space-efficient clones of parent LUNs. Creating LUN clones is highly space-efficient and time-efficient because the cloning operation does not involve physically copying any data. Clones help in space storage utilization of the physical aggregate space.

You can clone a complete LUN without the need of a backing Snapshot copy in a SAN environment. The cloning operation is instantaneous and clients that are accessing the parent LUN do not experience any

disruption or outage. Clients can perform all normal LUN operations on both parent entities and clone entities. Clients have immediate read/write access to both the parent and cloned LUN.

Clones share the data blocks of their parent LUNs and occupy negligible storage space until clients write new data either to the parent LUN, or to the clone. By default, the LUN clone inherits the space reserved attribute of the parent LUN. For example, if space reservation is disabled on the parent LUN, then space reservation is also disabled on the LUN clone.

> (i) When you clone a LUN, you must ensure that the volume has enough space to contain the LUN clone.

Initiator hosts

Initiator hosts can access the LUNs mapped to them. When you map a LUN on a storage system to the igroup, you grant all the initiators in that group access to that LUN. If a host is not a member of an igroup that is mapped to a LUN, that host does not have access to the LUN.

igroup name

The igroup name is a case-sensitive name that must satisfy several requirements.

The igroup name:

- Contains 1 to 96 characters. Spaces are not allowed.
- Can contain the letters A through Z, a through z, numbers 0 through 9, hyphen ("-"), underscore ("_"), colon (":"), and period (".").
- Must start with a letter or number.

The name you assign to an igroup is independent of the name of the host that is used by the host operating system, host files, or Domain Name Service (DNS). If you name an igroup aix1, for example, it is not mapped to the actual IP host name (DNS name) of the host.

> (i) You might find it useful to provide meaningful names for igroups, ones that describe the hosts that can access the LUNs mapped to them.

igroup type

The igroup type can be mixed type, iSCSI, or FC/FCoE.

igroup ostype

The ostype indicates the type of host operating system used by all of the initiators in the igroup. All initiators in an igroup must be of the same ostype. The ostypes of initiators are `solaris`, `windows`, `hpux`, `aix`, `netware`, `xen`, `hyper_v`, `vmware`, and `linux`.

You must select an ostype for the igroup.

LUNs window

You can use the LUNs window to create and manage LUNs and to display information about LUNs. You can also add, edit, or delete initiator groups and initiator IDs.

LUN Management tab

This tab enables you to create, clone, delete, move, or edit the settings of LUNs. You can also assign LUNs to a Storage Quality of Service (QoS) policy group.

Command buttons

- **Create**

  Opens the Create LUN wizard, which enables you to create LUNs.

  In a cluster on an AFF platform that does not contain any existing LUNs, the Create FC SAN optimized LUNs dialog box is opened, which enables you to set up one or more FC SAN optimized LUNs.

- **Clone**

  Opens the Clone LUN dialog box, which enables you to clone the selected LUNs.

- **Edit**

  Opens the Edit LUN dialog box, which enables you to edit the settings of the selected LUN.

- **Delete**

  Deletes the selected LUN.

- **Status**

  Enables you to change the status of the selected LUN to either Online or Offline.

- **Move**

  Opens the Move LUN dialog box, which enables you to move the selected LUN to a new volume or an existing volume or qtree within the same storage virtual machine (SVM).

- **Storage QoS**

  Opens the Quality of Service details dialog box, which enables you to assign one or more LUNs to a new or existing policy group.

- **Refresh**

  Updates the information in the window.

LUNs list

- **Name**

  Displays the name of the LUN.

- **SVM**

  Displays the name of the storage virtual machine (SVM) in which the LUN is created.

- **Container Path**

  Displays the name of the file system (volume or qtree) that contains the LUN.

- **Space Reservation**

  Specifies whether space reservation is enabled or disabled.

- **Available Size**

  Displays the space available in the LUN.

- **Total Size**

  Displays the total space in the LUN.

- **%Used**

  Displays the total space (in percentage) that is used.

- **Type**

  Specifies the LUN type.

- **Status**

  Specifies the status of the LUN.

- **Policy Group**

  Displays the name of the Storage QoS policy group to which the LUN is assigned. By default, this column is hidden.

- **Application**

  Displays the name of the application that is assigned to the LUN.

- **Description**

  Displays the description of the LUN.

Details area

The area below the LUNs list displays details related to the selected LUN.

- **Details tab**

  Displays details related to the LUN such as the LUN serial number, whether the LUN is a clone, LUN description, the policy group to which the LUN is assigned, minimum throughput of the policy group, maximum throughput of the policy group, details about the LUN move operation, and the application assigned to the LUN. You can also view details about the initiator groups and initiators that are associated

with the selected LUN.

- **Performance tab**

  Displays performance metrics graphs of the LUNs, including data rate, IOPS, and response time.

  Changing the client time zone or the cluster time zone impacts the performance metrics graphs. Refresh your browser to see the updated graphs.

Initiator Groups tab

This tab enables you to create, delete, or edit the settings of initiator groups and initiator IDs.

Command buttons

- **Create**

  Opens the Create Initiator Group dialog box, which enables you to create initiator groups to control host access to specific LUNs.

- **Edit**

  Opens the Edit Initiator Group dialog box, which enables you to edit the settings of the selected initiator group.

- **Delete**

  Deletes the selected initiator group.

- **Refresh**

  Updates the information in the window.

Initiator Groups list

- **Name**

  Displays the name of the initiator group.

- **Type**

  Specifies the type of protocol supported by the initiator group. The supported protocols are iSCSI, FC/FCoE, or Mixed (iSCSI and FC/FCoE).

- **Operating System**

  Specifies the operating system for the initiator group.

- **Portset**

  Displays the port set that is associated with the initiator group.

- **Initiator Count**

Displays the number of initiators added to the initiator group.

Details area

The area below the Initiator Groups list displays details about the initiators that are added to the selected initiator group and the LUNs that are mapped to the initiator group.

Portsets tab

This tab enables you to create, delete, or edit the settings of port sets.

Command buttons

- **Create**

  Opens the Create Portset dialog box, which enables you to create port sets to limit access to your LUNs.

- **Edit**

  Opens the Edit Portset dialog box, which enables you to select the network interfaces that you want to associate with the port set.

- **Delete**

  Deletes the selected port set.

- **Refresh**

  Updates the information in the window.

Portsets list

- **Portset Name**

  Displays the name of the port set.

- **Type**

  Specifies the type of protocol supported by the port set. The supported protocols are iSCSI, FC/FCoE, or Mixed (iSCSI and FC/FCoE).

- **Interface Count**

  Displays the number of network interfaces that are associated with the port set.

- **Initiator Group Count**

  Displays the number of initiator groups that are associated with the port set.

Details area

The area below the Portsets list displays details about the network interfaces and initiator groups associated with the selected port set.

Related information

[Creating LUNs](#)

[Deleting LUNs](#)

[Creating initiator groups](#)

[Deleting initiator groups](#)

[Adding initiators](#)

[Deleting initiators from an initiator group](#)

[Editing LUNs](#)

[Editing initiator groups](#)

[Editing initiators](#)

[Bringing LUNs online](#)

[Taking LUNs offline](#)

[Cloning LUNs](#)

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